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| SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH 1600 TCF TOWER 121 SOUTH EIGHT STREET MINNEAPOLIS, MN 55402 | | | EXAMINER KRAVETS, LEONID | |
| | | | ART UNIT 2189 | PAPER NUMBER |

DATE MAILED: 11/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/607,772 | Applicant(s) ROYER ET AL. | |
| | Examiner Leonid Kravets | Art Unit 2189 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 14-23 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

This Office Action has been issued in response to amendment filed 13 October 2005. Claims 1-23 are pending. Applicant's arguments have been carefully and fully considered in light of the instant amendment, but they are not persuasive. Accordingly this action has been made FINAL.

Specification

1. The previous objection to the title is withdrawn due to the amendment filed on 13 October 2005.
2. The previous objection to the abstract is withdrawn due to the amendment filed on 13 October 2005.
3. The previous objection to the disclosure is withdrawn due to the amendment filed on 13 October 2005.
4. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

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art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 21 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claimed "device option memory" is unclear.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear to the examiner what is meant by "a memory cached by a non-volatile cache". Data can be cached, but memory cannot.

The previous rejection under 35 U.S.C. 112, second paragraph, of the "operating system cache driver" is withdrawn due to amendment filed 13 October 2005.

9. The previous rejection under 35 U.S.C. 112, second paragraph is withdrawn due to the amendment filed on 13 October 2005.

10. The previous rejection under 35 U.S.C. 112, second paragraph is withdrawn due to the amendment filed on 13 October 2005.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. Claims 1-4, 6-10, 14, 16, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sarkozy, (US Patent 5,732,238) further in view of Handy (the Cache Memory book, Academic Press, 1998).

As per claim 1, Sarkozy teaches a method, comprising:

Recording an address of a write operation to a memory cached by a non-volatile cache (Col 2, lines 56-63).

Sarkozy does not specifically mention that recording an address of a write operation should be done prior to executing an operating system cache driver. However, Handy explains that disk caches are often implemented in dynamic RAM using software control. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Sarkozy in the manner of Handy since this would have provided a greater level of coherency and fault tolerance by making sure that no writes are ignored.

As per claim 2, Sarkozy teaches the method of claim 1, wherein recording the address of the write operation further comprises:

Recording the address in a log (Col 2, lines 64-65)

As per claim 3, Sarkozy teaches the method of claim 2, wherein the log is stored in a memory comprising at least one of a static random access memory, a dynamic random access memory, a flash memory, and a polymer ferroelectric RAM (Col 13, lines 34-36).

As per claim 4, Sarkozy teaches the method of claim 1, further comprising detecting a write operation (Col 3, lines 1-2).

As per claim 6, Sarkozy teaches the method of claim 1, further comprising:

Modifying data corresponding to the address of the write operation (Col 3, lines 9-13).

As per claim 7, the method of claim 6, wherein modifying the data corresponding to the address of the write operation further comprises:

Updating the data corresponding to the address of the write operation.

In Sarkozy, as in all systems, modifying data updates the data.

As per claim 8, Sarkozy teaches the method of claim 6, wherein modifying the data corresponding to the address of the write operation further comprises:

Invalidating the data corresponding to the address of the write operation (Col 3, lines 34-37).

As per claim 9, please see rejection of claim 1 above. Sarkozy claims an article comprising a machine-accessible medium having associated data, wherein the data, when accessed results in a machine performing:

Recording an address of a write operation to a memory cached by a non-volatile cache prior to executing an operating system cache driver (Col 2, lines 56-63)

As per claim 10, Sarkozy discloses the article of claim 9, wherein the data, when accessed, results in the machine performing:

Recording the address of the write operation in a log (Col 2, lines 64-65).

As per claim 14, Sarkozy teaches an apparatus, comprising:

A non-volatile cache (Col 2, line 41); and

A memory to store an address associated with a write operation to a memory cached by the non-volatile cache (Col 2, lines 56-63) prior to booting an operating system cache driver (See claim 1 rejection).

As per claim 16, Sarkozy discloses the apparatus of claim 1, wherein the memory comprises a non-volatile memory (Col 2, lines 56-58).

As per claim 19, see rejection of claim 1 above. Claim 19 is rejected for similar reasons.

14. Claims 5 and 17-18, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sarkozy in view of Handy as applied to claim 4 above, and further in view of Lee et al. (US Patent 5,937,433).

As per claim 5, Sarkozy teaches the method of claim 4; however, Sarkozy does not teach that detecting the write operation further comprises:

Trapping an interrupt request

Lee teaches the use of interrupt requests to detect write operations (Col 6, lines 6-8). The Lee and Sarkozy systems are compatible since they are in the same field of endeavor, namely cache control. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine Lee with Sarkozy in order to properly detect write operations, since this would have been the proper handling of input/output requests in a computer system, and thus more efficient.

As per claim 17, Sarkozy discloses the apparatus of claim 14; however, he does not disclose a module to receive an interrupt request associated with the write operation.

Lee teaches the use of interrupt requests to detect write operations (Col 6, lines 6-8). Please see rejection of claim 5 above.

As per claim 18, Sarkozy and Lee disclose the apparatus of claim 17; Lee further discloses the interrupt request is a basic input-output system interrupt request (Col 6, lines 6-7).

As per claim 20, please see rejection of claim 17 above.

15. Claims 11 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sarkozy in view of Handy as applied to claim 10 above, and further in view of Howard (US Patent 6,629,198)

As per claim 11, Sarkozy discloses the article of claim 10; however, he does not disclose that the log is included in a non-volatile memory.

Howard discloses that the log can be included in a non-volatile memory (Col 4, lines 42-43). The Sarkozy and Howard systems are compatible since they are in the same field of endeavor, namely data storage. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Sarkozy with Howard to use a non-volatile log, allowing for recovery from a network or disk failure (Col 5, lines1-2).

As per claim 23, Sarkozy discloses the system of claim 19; however, he does not disclose that the memory comprises a non-volatile memory to store a log including a plurality of memory addresses including the address of the write operation

Howard discloses that the log can be included in a non-volatile memory (Col 4, lines 42-43) and that the log includes a plurality of memory addresses including the address of the write operation (Col 2, lines 12-14). The Sarkozy and Howard systems are compatible since they are in the same field of endeavor, namely data storage. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Sarkozy with Howard to use a non-volatile log, to allow for recovery from a network or disk failure (Col 5, lines1-2).

16. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sarkozy in view of Handy as applied to claim 10 above, and further in view of Heemels (US Patent 5,603,331).

As per claim 12, Sarkozy discloses the article of claim 10; however, Sarkozy does not disclose the article wherein the data, when accessed, results in the machine performing:

Setting a flag to indicate an overrun of the log.

Heemels teaches setting a flag to indicate an overrun of the log (Col 9, lines 62-65). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine Sarkozy with Heemels, adding the overflow flag of Heemels to the device of Sarkozy in order to provide for data integrity in the log. Heemels provides this motivation by indicating the flag would prevent the overrun of the log data array.

17. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sarkozy in view of Handy as applied to claim 14 above, and further in view of PC Guide.

As per claim 15, Sarkozy discloses the apparatus of claim 14; however he does not disclose that the address is a logical block address. According to a definition in PC Guide (Logical Block Addressing), LBA addressing is the dominant form of hard disk addressing. PC Guide shows that the motivation for using LBA is to allow for large hard disks that would otherwise not be supported by the BIOS. One of ordinary skill in the art would have found it obvious at the time the invention was made to combine Sarkozy with the LBA definition in PC Guide in order to provide large hard disk compatibility for the apparatus of claim 14.

18. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sarkozy in view of Handy and Lee as applied to claim 20 above, and further in view of PC Guide.

As per claim 22, Sarkozy discloses the system of claim 20. Sarkozy does not disclose that the module of claim 20 is included in a basic input-output system. According to PC Guide, (BIOS Functions and Operation), a basic input-output system handles interrupts. Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the module receiving interrupt requests associated with write operations into the BIOS.

Allowable Subject Matter

14. Claim 13 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Response to Arguments

15. Applicant's arguments filed 13 October 2005 have been carefully and fully considered but they are not deemed persuasive.

On page 1 of the remarks, examiner accepts the submission of formal drawings, changes to the specification and abstract.

16. Under the heading §112 Rejection of the Claims, applicant argues "A device option memory is well-known to those of ordinary skill in the art, including, for example, such items as an option read only memory (OROM or OPROM), which may comprise '...firmware that is called by the system BIOS. For example, an adapter card that controls a boot device might contain firmware that is used to connect the device to the system once the Option ROM is loaded."

The examiner respectfully disagrees. While applicant defines a device option read only memory as ROM or OROM within the specification, examiner notes that the phrase "device option memory" appears nowhere within the cited definition. Examiner notes that applicant's definition defines an "Option ROM", the word "device" does not appear in the term or its definition.

17. With respect to applicant's argument located and starting within the first paragraph of page 12 of the instant arguments in reference to a "memory cached by a non-volatile cache"

The examiner believes an appropriate explanation of the problem with “memory cached by a non-volatile cache” was given. A definition of cache is “...a collection of data duplicating original values stored elsewhere or computed earlier...” Therefore, a cache memory is used to cache data, it can not be used to cache another memory.

Under paragraph 3 of the instant remarks, applicant introduces a function description citing “the allocated memory is cached...” as an example of use of the rejected language. The examiner notes that these examples are not convincing; statement of similar errors found on the Internet does not prove applicant’s terminology to be proper, since they are still errors.

18. With respect to applicant’s argument located and starting within the first paragraph of page 12 of the instant arguments in reference to an “operating system cache driver,” the applicant’s arguments have been fully considered and the rejection has been withdrawn.

19. With respect to applicant’s argument located and starting within the last paragraph of page 12 of the instant arguments. Examiner accepts the clarification of “memory” recited within claims 16, 19 and 23. Examiner further withdraws the rejection of claims 14, 16, 19 and 23.

20. Under the heading §103 Rejection of the Claims, applicant argues on page 14 that Sarkozy does not disclose “that recording an address of a write operation should be

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done prior to executing an operating system driver.” The examiner’s rejection states “Handy explains that disk caches are often implemented in dynamic RAM using software control.”

The examiner disagrees with the applicant’s argument that Handy does not disclose the above limitation. It is noted that although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Examiner’s broadest reasonable interpretation is write addresses can be written at any time and the cache driver can be one of many Operating System cache drivers loaded in the system. This can happen if there are multiple caches. Examiner notes that the language of the claim states “recording an address of a write operation to a memory cached by a non-volatile cache prior to executing an operating system cache driver” this claim does not in any way tie the non-volatile cache to the operating system cache driver.

In response to applicant’s argument that there is no motivation to combine the references, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

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Examiner notes the given motivation to combine was to provide for a greater level of coherence and fault tolerance, by making sure no writes are ignored. The given motivation provides reason to combine the references. While the examiner agrees that the teachings of Handy are directed toward CPU caches, examiner notes that all caches share many desirable qualities such as speed, data coherence and fault tolerance.

Applicant further argues on page 15 that combining the references provides no reasonable expectation of success. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument under the heading Allowable Subject Matter. The examiner wishes to apologize for the typographical error made in the non-final office action. Claim 13 was allowable, not claim 14. Since a rejection was made of claim 14 and applicant argued the rejections, examiner hopes this error has not caused any confusion.

Conclusion

21. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonid Kravets whose telephone number is (571) 272-2706. The examiner can normally be reached on Mon-Fri 8-430.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim can be reached on (571) 272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Leonid Kravets
Patent Examiner
Art Unit 2189

October 27, 2005


BEHZAD JAMES PEIKARI
PRIMARY EXAMINER